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Patentanmeldung Nr. | Patent application No. | Demande de brevet n°

04405059.9

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For the President of the European Patent Office

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R C van Dijk

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If no title is shown please refer to the description.
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Container with a pressure control device

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Container with a pressure control device

The present invention concerns a container with a pressure control device according to the preamble part of claim 1.

Such a container with a pressure control device is known, e.g. from PCT patent application WO-A-99/62791. The device described therein is provided for maintaining a constant predetermined pressure in a container which is arranged for dispensing a fluid. The pressure control device has a first chamber and a second chamber, as well as a closing member movable relative to the second chamber for releasing and closing a fluid connection between the first chamber and the container depending on the position of the closing member relative to the second chamber. The first chamber is filled with a gas which, in use, has a higher pressure than the pressure in the container. The second chamber is closed having a gas at a predetermined or reference pressure and is located outside the first chamber. In a first embodiment according to Fig. 2 the first chamber is provided as a cup-shaped holder which is placed upside down in the container and has its longitudinal edge joined together with the bottom and the upright sidewall of the vessel or container. In Figure 3 a second embodiment is shown in which the diameter of cup-like first chamber is much smaller than the inner diameter of the container. The chamber is centrally disposed within the container and joined at its longitudinal edge with the bottom of the container. In Figure 4 a third embodiment is shown in which the same first chamber as in Figure 4 is disposed eccentrically with respect to the container. In Figure 5 a disc is provided slightly below the middle of the height of the vessel and is gas-tightly connected with the inner wall of the vessel through a sealing ring. This disc divides the vessel into two (fixed arranged) parts. A similar construction is shown in Figures 6a and 6b. Further, in Figure 7 the first chamber of pressure control device is designed as a plunger which is sealed to the inner wall of the container with a sealing ring and which can be moved in axial direction within the container. Thus, the plunger divides the container in two parts, wherein the upper part is filled with the fluid to be dispensed. The fluid connection from the first chamber terminates in the lower

part. When the pressure in the container drops since fluid has been dispensed by the push button on top of the container, the plunger is moved upwards because of the pressure difference between the lower and the upper part until pressure equilibrium between the lower and the upper part is obtained again. Therefore, the pressure in the lower part has decreased so that the pressure in the second chamber will be higher and the closing member will open the fluid connection between the first chamber and the lower part, so that the pressure in the lower part will raise. The plunger will then be moved upwards again until a pressure equilibrium is achieved corresponding to the predetermined or reference pressure in the second chamber. Finally, in the embodiment according to Figure 8 the first chamber is of cylindrical design and has an outer diameter corresponding to the inner diameter of the container and thus fitted tightly within the container.

Only the pressure device of figure 7 is movable in axial direction. In all other examples the pressure device is fixedly arranged within the container. Since the complete pressure control device of figure 7 is moved within the container, the pressure in the first chamber must be higher as in the other embodiments wherein the pressure device is fixedly mounted. On the other hand, in the example of figure 7 the plunger functions as a movable piston which expels the dispensing fluid. However, the design of the pressure control device is disadvantageous because of its large dimensions so that only a small part of the container can be used for the dispensing fluid.

It is therefore an object of the present invention to provide a container with a pressure control device which is simpler in construction and easier in use, such that the volume of the container can be used to a much larger extent.

Further advantages of the invention are disclosed in the dependent claims and in the following description in which an exemplified embodiment of the invention is described with respect to the accompanying drawings. It shows

Fig. 1 a pressure control device in perspective view and in cross-section,

Fig. 2 the same pressure control device in a perspective front view,

Fig. 3 the same pressure control device in a perspective view on its bottom,

Fig. 4 an exploded view of the pressure control device of Fig. 1,

Fig. 5, 6 cross-sections through a second embodiment of the pressure control device,

Fig. 7 a plastic bottle with a top dispenser, an inserted pressure control device and a movable piston,

Fig. 8 a plastic bottle with a dispensing valve, an inserted pressure control device and a suction tube, and

Specific numbers dedicated to elements defined with respect to a particular figure will be used consistently in all figures if not mentioned otherwise.

In figures 1 to 4 a pressure control device 1 for maintaining a constant predetermined excess pressure in a container is shown in cross-section and in a perspective view. The device 1 consists of a jar-shaped container 2 with an ring-shaped insert 3 which is mounted in a pressfit joint to the container 2. As can be seen in Fig. 4 the container 2 has a narrower cylindrical neck part 4 and an outward projecting ring-shaped rim 5. Within the cylindrical neck part 4 a ring-shaped groove 6 is provided. The insert 3 has a cup-like lower part 7 with a small central opening 8 at its bottom and an upper outwardly projecting ring-shaped rim 9 which outer boundary coincides with the outer boundary of the rim 5. The cup-like lower part 7 has an projecting ring 10 which cooperates with ring-shaped groove 6 of the container 2. In the central opening 8 a piston 11 with a stem 12 is provided with is movable in a reciprocating manner. The piston 11 has further a circumferential groove 13 containing a sealing ring 14. The piston 11 on its part is movable arranged within a cylinder 15 which is closed at is upper end 16. The cylinder 15 is clamped by a retaining ring 17 at the upper end of the insert 3. As can be seen in Fig. 1 the retaining ring 17 is U-shaped in cross-section and has a circumferential ring 18 which cooperates with a circumferential groove 19 at the upper inside end of the insert 3. As further can be seen in figures 1 and 4 the bottom 20 of the container 2 has a central opening 21 which is closed by a so

called Nicholson plug 22. The stem 12 of the piston 11 has a circumferential groove (not visible here) which is enclosing a sealing ring or O-ring 23 and has a pressfit cylindrical stop 24 preventing the stem 12 passing beyond the opening 8 of the insert 3.

In figures 5 and 6 a modification of the pressure control device 1 is shown wherein a screw cap 30 is provided on a cover member 32 of a cylindrical container 33.The cover member 32 is in its central region provided with a cup-like insert 34 having a first cylindrical part 35 with a first, large inner diameter, a contiguous second cylindrical part 36 having a second, smaller inner diameter and a contiguous third cylindrical part 37 having a third, still smaller inner diameter, and providing an opening 38 into the container 33. The screw cap 30 is provided with an upper ring 39 having an inner screw thread 40 which cooperates with an outer screw thread 41 of a ring 42 provided on top of the cover member 32. The screw cap 30 has further within the ring 39 a protruding flange 43 which has an outer diameter approximately commensurate to the inner diameter of the first cylindrical part 35 of the cover member 32. The end portion 44 of the flange 43 is slightly bulged inwardly as to enclose a cylindrical cup 45. Within the cylindrical cup 45 a piston 46 is reciprocating, which is formed in a similar manner as the piston 11 of the embodiment of Figures 1 to 4. The piston 46 has also a stem 47 which is movable arranged in a reciprocating manner in opening 38. A sealing ring or O-ring 48 is further provided which lying in an annular groove 49 provided at the top of the cylindrical part 37. A stop member 50 screwed in the second cylindrical part 36 catches the O-ring 48 against the annular groove 49. The upper part of the piston 46 is formed as a hollow cylinder 51 and has an outer annular groove 52 in which a sealing ring 53 is provided. The hollow cylinder 51 and the cylindrical cup 45 form a second closed chamber 55 in which a gas is filled in with a predetermined excess pressure. The cover member 32 is further provided with an outward flange 57 having a specific clamping form for a snap-on connection to the pointed rim 58 of the container 33.

As can be seen in Figures 5 and 6 there is further a small channel 60 between the flange 43 and the upper cylindrical part 35 of the cover member 32. The container 33 provides a first chamber 61 which is filled with a gas at a higher pressure than the predetermined excess pressure of the gas in the second chamber 55.

In Figure 7 a first application of the pressure control device of Figure 1 in a bottle is shown. The bottle 65 is formed from PET by stretch blow moulding and contains the pressure control device 1 at its bottom part 66. The device 1 is punctually welded by laser to the wall of the bottle. Since the bottle 65 is transparent and the container 2 of the pressure control device 1 is capable of absorbing the infrared energy from the laser the container 2 will be heated locally so that a punctual laser weld will occur between the bottle 65 and the container 2. Infrared absorbing materials are e.g. moulding pigment containing carbon black or an infrared absorbing coating which is applied locally. The laser apparatus is at a fixed position and the bottle 65 with inside the container 2 will be rotated in front of the laser apparatus and thus providing a hermetic weld with a very good joint strength. Above the container 2 a resilient piston 66 of an adequate plastic material like polypropylene with sealing ribs 67 is provided. Over the piston 66 is a viscous liquid or cream 68 which is released by a nozzle 69 which is actuated by a push button 70. As usual a closing cap 71 over the push button 70 is provided.

In Figure 8 a second application of the pressure control device is shown, in which a suction tube 72 connected to a pressure control valve (not visible) within the push button 70 is provided. In this case there is a liquid of normal viscosity filled in the bottle 66 which is sprayed by the nozzle 69.

Claims

1. Container with a pressure control device for maintaining a constant predetermined excess pressure for dispensing a fluid, wherein the device comprises a first chamber, a passageway from the first chamber to the container, a valve for releasing and closing said passageway and a resilient pressure element exerting said predetermined excess pressure onto the valve in closing direction, the first chamber being filled with a gas at a pressure higher than said predetermined excess pressure, and means for releasing said valve if the fluid pressure in the container drops below the predetermined excess pressure, so that gas flows from the first chamber to the container until the container pressure approximately equals said predetermined pressure, wherein the pressure control device is fixedly arranged within said container, characterized in that a movable piston within said container is provided between the control device and the dispensing opening of the container, separating said fluid and said pressure gas, and which piston is moved towards the dispensing opening by the excess pressure prevailing in said container.

2. Container as claimed in claim 1, wherein said passageway opens into a second chamber outside of the first chamber and the valve is a plunger movable within said first chamber, the stem thereof being the closing member.

3. Container as claimed in claim 2, wherein the container is cylindrical and the first chamber is also cylindrical with a diameter corresponding to the inner diameter of the container.

4. Container as claimed in claim 3, wherein the first chamber is arranged as a jar having a lid enclosing said second chamber.

5. Container as claimed in claim 4, wherein said second chamber comprises a cylindrical enclosure which is centrally disposed in said lid and contains said

passageway and is fixedly enclosing a closing cup, in which the plunger is movable.

6. Container as claimed in claim 5, wherein said closing cup is part of a screwing cap, which is screwed in said cylindrical enclosure, such that the volume of the closing cup is changeable.

7. Container as claimed in claim 5 or 6, wherein a longitudinal groove is provided within said cylindrical enclosure communicating between the second chamber and the container.

8. Container as claimed in claim 2, wherein the stem is provided with an annular groove cooperating with a sealing ring within the passageway in order to release and close the passageway.

9. Container as claimed in one of claims 1 to 8, wherein the components of the pressure control device are made of PET.

10. Container as claimed in one of claims 1 to 9, wherein the movable piston is designed as a dome with annual sealing ribs and is made of resilient plastic material.

Summary

The present invention concerns a container with a pressure control device for maintaining a constant predetermined excess pressure for dispensing a fluid. The device comprises a first chamber, a passageway from the first chamber to the container, a valve for releasing and closing said passageway and a resilient pressure element exerting said predetermined excess pressure onto the valve in closing direction. The first chamber being filled with a gas at a pressure higher than said predetermined excess pressure, and means for releasing said valve if the fluid pressure in the container drops below the predetermined excess pressure, so that gas flows from the first chamber to the container until the container pressure approximately equals said predetermined pressure, wherein the pressure control device is fixedly arranged within said container. A movable piston within said container is provided between the control device and the dispensing opening of the container, separating said fluid and said pressure gas, and which piston is moved towards the dispensing opening by the excess pressure prevailing in said container.

(Fig. 1)

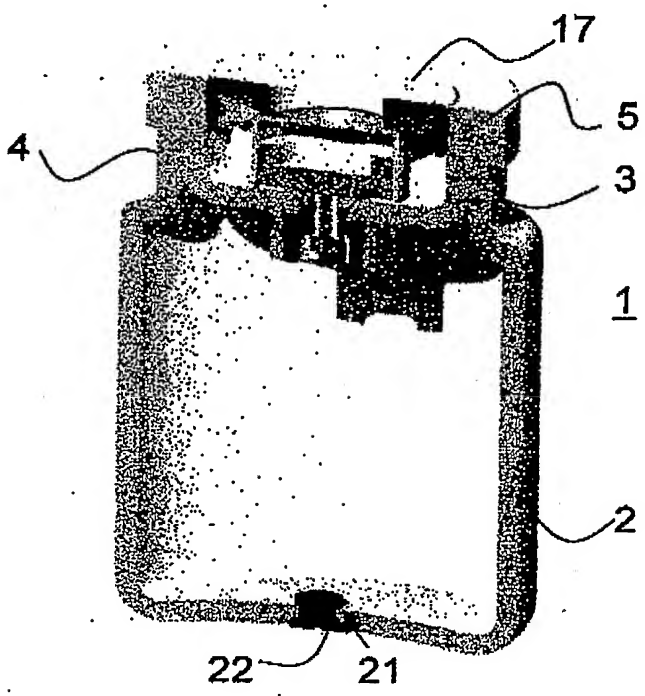

Fig. 1

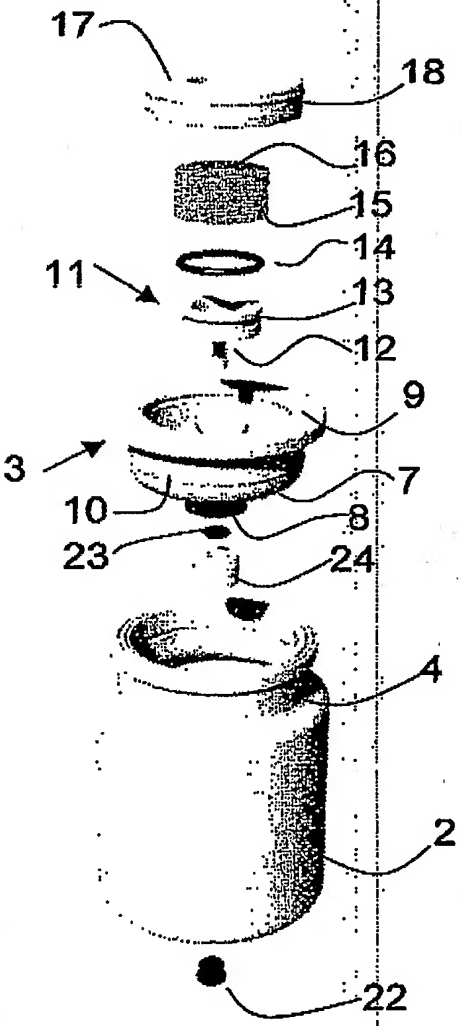

Fig. 4

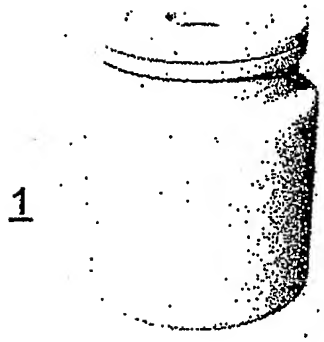

Fig. 2

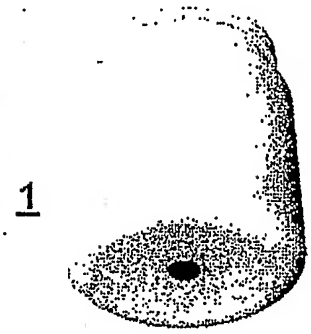

Fig. 3

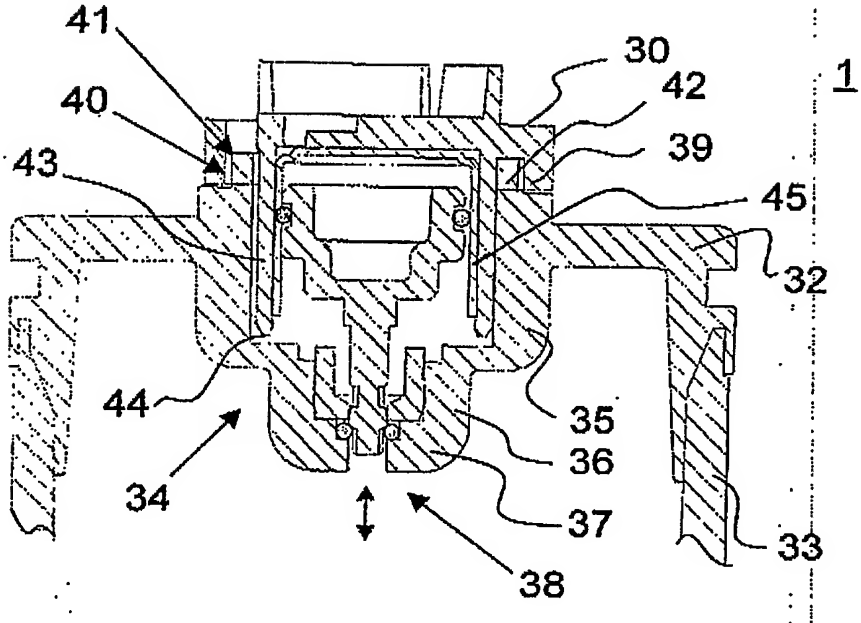
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Fig. 5

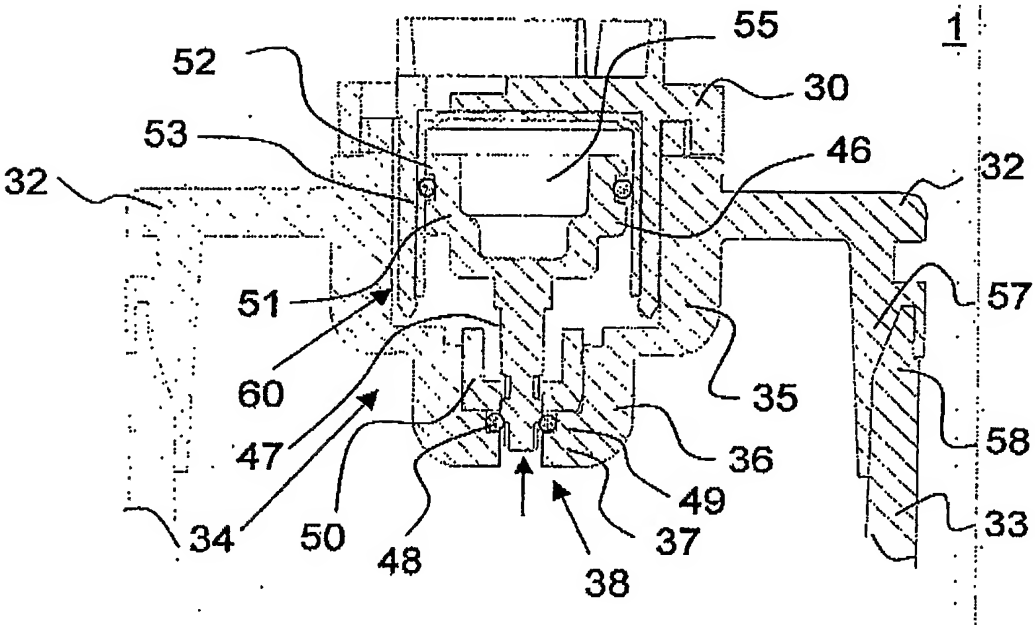
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Fig. 6

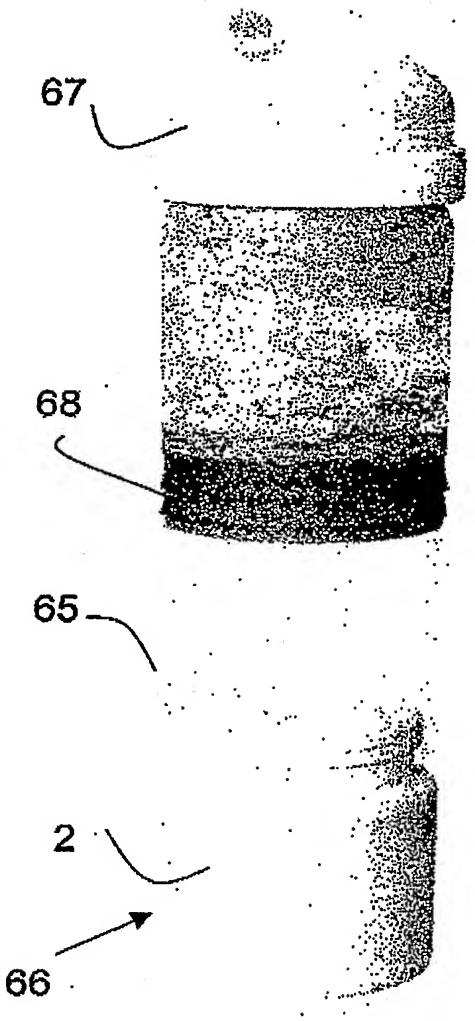

Fig. 7

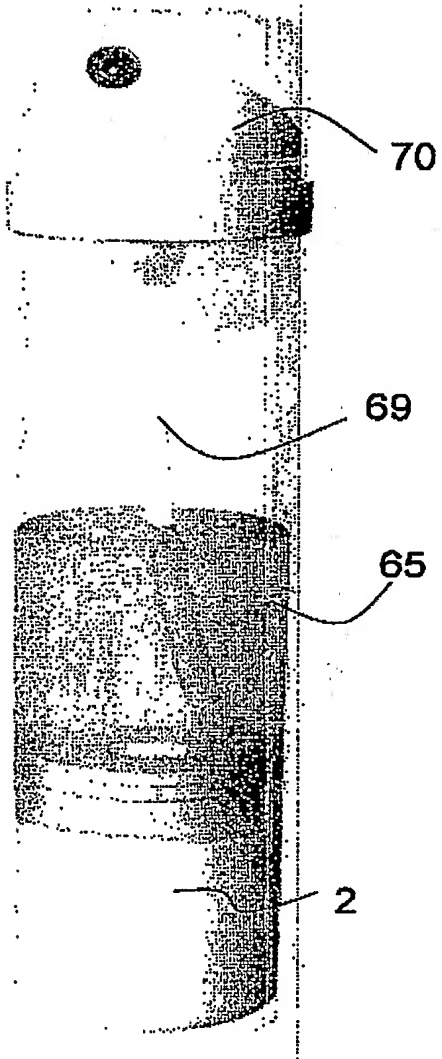

Fig. 8

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Patent- und Markenanwälte

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Europäische Patentanmeldung : " Container with a pressure control device"

Sehr geehrte Damen und Herren

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